REMARKS

Claims 17, 23, 33, 34, 41, 42, 54, 62, and 64 have been amended. Claims 89 - 122 have been added to claim the invention with more particularity. Of the new claims, Claims 95 and 109 are independent claims. The remaining new claims are dependent claims. No claims have canceled. Accordingly, Claims 17 - 122 are now pending.

The revisions to Claims 17, 23, 33, 34, 41, 42, 54, 62, and 64 correct self-evident wording errors. In Claims 17 and 23, the missing article "a" has been inserted before "body region" in introducing the body region. In Claims 33, 34, 42, 54, 62, and 64, "finger" has been changed to "finger portion" to conform with the use of "finger portion" elsewhere in the claims. The term "body" has been corrected to "body region" in Claim 41.

Claims 17 - 31, 38 - 67, 69, and 71 - 88 have been rejected under 35 USC 102(e) as anticipated by Litwin et al. ("Litwin"), U.S. Patent 6,100,770. Claims 32 - 37, 68, and 70 have been rejected under 35 USC 103(a) as obvious based on Litwin in view of Misu et al. ("Misu"), Japanese Patent Publication 7-226643. These rejections are respectfully traversed.

The first sentence of the 35 USC 102(e) anticipation rejection in the present Office Action finally corrects the procedural error involving the rejection of Claims 33 - 37 and 70 on narrower art (Litwin) than the art (Litwin and Misu) utilized to reject independent Claim 32 from which Claims 33 - 37 and 70 depend. However, the reasoning given in the remainder of the 35 USC 102(e) rejection in the present Office Action refers to Claims 33 - 37 and 70 and indicates that these six claims are still being rejected as anticipated by Litwin even though this is procedurally incorrect. Since the references to Claims 33 - 37 and 70 in the 35 USC 102(e) anticipation section of the present Office Action are incorrect, Applicant's Attorney will ignore these references in responding to the 35 USC 102(e) rejection of Claims 17 - 31, 38 - 67, 69, and 71 - 88.

The present 35 USC 102(e) anticipation rejection substantially repeats the 35 USC 102(e) anticipation rejection presented in the Office Action mailed 17 March 2003 and repeated in the Office Action mailed 16 September 2003 insofar as Claims 17 - 31, 38 - 67, 69, and 71 - 88 are concerned.

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Reasons were presented in the Amendment submitted 19 December 2002 as to why Claims 17 - 31, 38 - 67, 69, and 71 - 88 are patentable over Litwin. Those reasons were largely repeated in the Response submitted 17 June 2003. In light of the minor revisions

made to independent Claims 17 and 71 in the Amendment submitted 14 January 2004, additional reasons were presented in the January 2004 Amendment as to why Claims 17 and 71 and their dependent claims are patentable over Litwin.

Nothing in the present Office Action shows why any of the previously presented reasons is wrong or why any of Claims 17 - 31, 38 - 67, 69, and 71 - 88 is unpatentable based on Litwin. Accordingly, the 35 USC 102(e) anticipation rejection is traversed for substantially the same reasons presented in the December 2002 Amendment, the June 2003 Response, and the January 2004 Amendment. Since those reasons have already been presented in communications to the PTO, Applicant's Attorney will not again repeat these reasons. Instead, Applicant's Attorney refers the Examiner to the December 2002 Amendment, the June 2003 Response, and the January 2004 Amendment.

In explaining why Claims 17, 18, 71, and 72 were revised in the January 2004 Amendment, Applicant's Attorney first presented the following Litwin material on pages 20 - 22 of the January 2004 Amendment:

> Litwin discloses several modes for operating the varactor of Fig. 1. A first operational mode, referred to here as mode 1, is disclosed at col. 5, lines 21 - 58, with respect to the schematic varactor diagram of Fig. 4 corresponding to Fig. 1. In mode 1, a voltage is applied between electrodes CA and CB to produce a depletion layer below the gate dielectric layer that underlies gate electrode 16. Electrode CA is connected to source 13 and drain 14 while electrode CB is connected to gate electrode 16. Litwin states that the capacitance between electrodes CA and CB is the series combination of gate dielectric capacitance COX and depletion layer capacitance CD. Adjusting the voltage between electrodes CA and CB causes depletion layer capacitance CD to change so as to change the overall capacitance between electrodes CA and CB.
>
> Litwin does not disclose any electrode connection to well 12 in mode 1. Hence, well 12 is presumably floating, i.e., not connected to any external electrode, in mode 1.
>
> A second operational mode, referred to here as mode 2, is disclosed at col. 5, lines 59 - 64. In mode 2, depletion layer capacitance C_D is controlled by applying a suitable variable potential to well 12 while electrodes C_A and C_B are maintained at respective fixed potentials. Again, electrode C_A is connected to source 13 and drain 14 while electrode C_B is connected to gate electrode 16.
>
> A third operational mode is disclosed at col. 5, lines 64 - 67, where Litwin states that "a fixed potential is applied to one of the electrodes C_A or C_B the other electrode is connected to the well 12 and the device is controlled

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by a suitable voltage applied to the well". The third operational mode divides into two sub-modes referred to here as sub-mode 3A and sub-mode 3B. In sub-mode 3A, a fixed potential is applied to electrode C_A connected to source 13 and drain 14, and a variable potential is applied to electrode C_B connected to well 12. In sub-mode 3B, a fixed potential is applied to electrode C_B connected to gate electrode 16, and a variable potential is applied to electrode C_A connected to well 12.

Litwin is unclear as to whether the connection of electrode C_A or C_B to well 12 in the third mode is alternative to, or in addition to, the earlier-identified C_A and C_B connections. In preparing the December 2002 Amendment and June 2003 Response, Applicant's Attorney had concluded that Litwin means the alternative situation. The following connections then occur in sub-mode 3A: electrode C_A is connected to source 13 and drain 14, electrode C_B is connected to well 12, and gate electrode 16 is unconnected. This electrical arrangement is referred to here as mode 3A1. For the alternative situation, sub-mode 3B similarly becomes sub-mode 3B1 in which electrode C_A is connected to well 12, electrode C_B is connected to gate electrode 16, and source 13 and drain 14 are unconnected.

Applicant's Attorney reviewed Litwin with Applicant in the course of preparing this amendment. In that review, Applicant was of the view that Litwin means the additional, rather than alternative, situation. Sub-mode 3A then has the following connections referred to here as mode 3A2: electrode C_A is connected to source 13 and drain 14, and electrode C_B is connected to gate electrode 16 and well 12. Similarly, sub-mode 3B has the following connections referred to here as mode 3B2: electrode C_A is connected to source 13, drain 14, and well 12, and electrode C_B is connected to gate electrode 16. The electrical connections for the six possible operational modes in Litwin are, for convenience, summarized below:

Summary of Litwin's Possible Operational Modes

Mode 1:
a. Source 13 and drain 14 connected to electrode C_A
b. Gate electrode 16 connected to electrode C_B with variable potential applied between electrodes C_A and C_B whereby potential between source 13 and gate electrode 16 is variable
c. Well 12 unconnected

Mode 2:
a. Source 13 and drain 14 connected to electrode C_A at fixed potential
b. Gate electrode 16 connected to electrode C_B at fixed potential
c. Well 12 connected to further electrode at variable potential whereby (a) potential between source 13 and well 12 is variable and (b) potential between gate electrode 16 and well 12 is variable

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Mode 3A1:
a. Source 13 and drain 14 connected to electrode C_A at fixed potential
b. Gate electrode 16 unconnected
c. Well 12 connected to electrode C_B at variable potential whereby potential between source 13 and well 12 is variable

Mode 3A2:
a. Source 13 and drain 14 connected to electrode C_A at fixed potential
b. Gate electrode 16 connected to electrode C_B at variable potential whereby potential between source 13 and gate electrode 16 is variable
c. Well 12 connected to electrode C_B whereby (a) potential between gate electrode 16 and well 12 is zero and (b) potential between source 13 and well 12 is variable and equals potential between source 13 and gate electrode 16

Mode 3B1:
a. Source 13 and drain 14 unconnected
b. Gate electrode 16 connected to electrode C_B at fixed potential
c. Well 12 connected to electrode C_A at variable potential whereby potential between gate electrode 16 and well 12 is variable

Mode 3B2:
a. Source 13 and drain 14 connected to electrode C_A at fixed potential
b. Gate electrode 16 connected to electrode C_B at variable potential whereby potential between source 13 and gate electrode 16 is variable
c. Well 12 connected to electrode C_A whereby (a) potential between source 13 and well 12 is zero and (b) potential between gate electrode 16 and well 12 is variable and equals potential between gate electrode 16 and source 13

Although six operational modes are given here, only four of these modes actually apply to the varactor of Figs. 1 and 4 since Litwin means the two sub-modes of the third operational mode to be either modes 3A1 and 3B1 or modes 3A2 and 3B2. Subject to appropriately adjusting the electrode connections, the varactor of Figs. 1 and 4 of Litwin can then be operated in any of modes 1, 2, 3A1, and 3B1 or in any of modes 1, 2, 3A2, and 3B2 depending on whether Litwin means modes 3A1 and 3B1 or modes 3A2 and 3B2.

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With the foregoing material from the January 2004 Amendment in mind, independent Claims 17 and 71 are repeated below:

17. A structure comprising a varactor which comprises:

a plate region and a body region of a semiconductor body, the body region being of a first conductivity type, the plate region being of a second

conductivity type opposite to the first conductivity type, the plate and body regions meeting each other to form a p-n junction;

a plate electrode and a body electrode respectively connected to the plate and body regions, the plate electrode being at a plate-to-body bias voltage relative to the body electrode;

a dielectric layer situated over the semiconductor body and contacting the body region; and

a gate electrode situated over the dielectric layer at least where the dielectric layer contacts material of the body region, the gate electrode being at a gate-to-body bias voltage relative to the body electrode, the gate-to-body voltage being maintained approximately constant at a non-zero value as the plate-to-body voltage is varied.

71. A method comprising:

providing a varactor which comprises (a) a plate region and a body region of a semiconductor body, (b) a plate electrode and a body electrode respectively connected to the plate and body regions, (c) a dielectric layer situated over the semiconductor body and contacting the body region, and (d) a gate electrode situated over the dielectric layer at least where the dielectric layer contacts material of the body region, the body region being of a first conductivity type, the plate region being of a second conductivity type opposite to the first conductivity type, the plate and body regions meeting each other to form a p-n junction;

applying (a) a plate-to-body bias voltage between the plate and body electrodes and (b) a gate-to-body bias voltage between the gate and body electrodes; and

varying the plate-to-body voltage while maintaining the gate-to-body voltage approximately constant at a non-zero value to cause an inversion layer that meets the plate region to selectively appear and disappear in the body region below the gate electrode.

On pages 23 and 24 of the January 2004 Amendment, Applicant's Attorney presented the following comments about Litwin with respect to Claims 17 and 71:

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The potential between (a) gate electrode 16 analogized by the Examiner to the gate electrode of the present claims and (b) well 12 analogized by the Examiner to the body region of the present claims is <u>zero</u> in mode 3A2 of Litwin because gate electrode 16 and well 12 are then both electrically connected to electrode C_B. To the extent that Litwin might mean sub-mode 3A to be mode 3A2 and to the extent that a zero potential between the two electrodes analogized by the Examiner to the gate and body electrodes might be construed as a constant value of the gate-to-body voltage, Claims 17 and 71 have each been amended to recite that the gate-to-body voltage is

> maintained approximately constant at a <u>non-zero</u> value. Since the gate-to-well potential is <u>zero</u> in mode 3A2, mode 3A2 does <u>not</u> meet the requirement of Claims 17 and 71 that the constant value of the gate-to-body voltage <u>differ from zero</u>.
>
> In none of Litwin's other five possible operational modes is the potential between gate electrode 16 and well 12 maintained approximately constant at any value, including "zero". Consequently, the amendment of Claims 17 and 71 to recite that the gate-to-body voltage be maintained approximately constant at a non-zero value distinguishes Claims 17 and 71 from each of Litwin's possible operational modes including mode 3A2 in which the potential between gate electrode 16 and well 12 is zero.

In apparent response to the preceding comments, the Examiner first states on page 3 of the present Office Action that "Applicant argues, after an analysis of the operation of the device in the Litwin reference, that the gate electrode in the reference and the well region both have the same connection to electrode CB, and therefore, have a zero voltage difference". To the extent that this statement might be interpreted to apply to all six of the possible modes for operating the varactor in Figs. 1 and 4 of Litwin, this statement is misrepresentative of what Applicant's Attorney said on pages 23 and 24 of the January 2004 Amendment about Litwin with respect to Claims 17 and 71. The Examiner's statement is true for mode 3A2. However, the statement is not true for any of the other five possible modes for operating the varactor in Figs. 1 and 4 of Litwin.

Claims 17 and 71 each require that the gate-to-body voltage be maintained approximately constant at a non-zero value. After stating that Applicant concludes that "this limitation in the claims", presumably Claims 17 and 71 and their dependent claims, "is not met", i.e., presumably not met by Litwin, the Examiner goes on at page 3 of the present Office Action to state that "Litwin discloses at column 5, lines 63 and 64, 'the device may also be operated by applying fixed potentials to the electrodes CA and CB and controlling the capacitance of the device by a suitable voltage applied to the well'" and that "another operational mode of the varactor in the reference is directly applying a voltage to the well". By these two statements, the Examiner is apparently referring to mode 2 for operating Litwin's varactor in Figs. 1 and 4.

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The Examiner continues on page 3 of the present Office Action with the statement that "another operational mode is electrode CA fixed, while electrode CB varies along with the well (body) voltage; that is one of the CA and CB varies with the well voltage, since it is

connected to the well, while the other electrode that is not connected to the well is fixed (again, see column 5, lines 59-67)". In this statement, the Examiner seems to be mixing modes. The first part of the statement (up to the semicolon) deals with sub-mode 3A for operating Litwin's varactor in Figs. 1 and 4. The remainder of the Examiner's statement deals with mode 3, i.e., both of sub-modes 3A and 3B and thus with all four of the modes described as modes 3A1, 3A2, 3B1, and 3B2 in the January 2004 Amendment.

In any event, the Examiner then alleges on page 3 of the present Office Action that "But the fact that the Well and one of the electrodes have the same potential does not mean that the constant value is zero, rather it could be any voltage other than zero". To the extent that Applicant's Attorney understands this statement, it is incorrect.

By alleging that "But the fact that the Well and one of the electrodes have the same potential does not mean that the constant value is zero, rather it could be any voltage other than zero", the Examiner is presumably referring to mode 3A2 in which well 12 and gate electrode 16 in Litwin are both connected to electrode C_B that receives a variable potential. The gate-electrode-to-well potential for Litwin's varactor in Figs. 1 and 4 is the potential of gate electrode 16 to the potential of well 12, i.e., the potential of gate electrode 16 minus the potential of well 12.

Let V_{CB} represent the potential at electrode C_B. In mode 3A2, the potentials of gate electrode 16 and well 12 are both V_{CB} since gate electrode 16 and well 12 are both connected to electrode C_B. The gate-electrode-to-well potential in mode 3A2 is then V_{CB} (the potential of gate electrode 16) minus V_{CB} (the potential of well 12). This difference is exactly zero. No result other than zero is possible for the gate-electrode-to-well potential in mode 3A2 using any system of accurate mathematics known to Applicant's Attorney.

Utilizing the Examiner's analogies of gate electrode 16 and well 12 of Litwin respectively to the gate electrode and body region of the present claims, the gate-electrode-to-well potential in Litwin is analogous to the gate-to-body voltage of Claims 17 and 71. Hence, the gate-to-body voltage in mode 3A2 for the varactor in Figs. 1 and 4 of Litwin is identically zero. When operating in mode 3A2, Litwin's varactor in Figs. 1 and 4 does not meet the limitation of Claims 17 and 71 that the gate-to-body voltage be maintained approximately constant at a non-zero value.

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The gate-electrode-to-well potential is <u>not</u> maintained approximately constant in <u>any</u> of the <u>other</u> possible modes for operating the varactor in Figs. 1 and 4 of Litwin. The limitation of each of Claims 17 and 71 that the gate-to-body voltage be maintained approximately <u>constant</u> at a <u>non-zero</u> value is thus <u>not</u> met by any of Litwin's varactors operating in any of the possible operational modes. Accordingly, Litwin does not anticipate Claim 17 or 71.

The Examiner continues on page of the present Office Action with the further allegations that:

> [T]he potential between the gate and well need not be zero (mode 3A2, part (c) on page 17 of the applicant's arguments). That is, also the differential potential between the gate and well could be zero in that mode, but it could as well be a value greater than zero. Note that claim 71 requires that the gate-to-body voltage being constant at a non-zero value. In another words, the voltage difference between the gate and the well is zero, but they could be held at a non-zero voltage and still have the same value (voltage), which is a constant value, let's say C, where C is a non-zero numerical constant.

The further allegation that "the potential between the gate and well need not be zero" in mode 3A2 of Litwin is <u>incorrect</u> for the reasons stated above in connection with the Examiner's earlier allegation that "But the fact that the Well and one of the electrodes have the same potential does not mean that the constant value is zero, rather it could be any voltage other than zero". Since gate electrode 16 and well 12 in Litwin both receive the same potential, the difference between the potentials at gate electrode 16 and well 12 can <u>only</u> be <u>zero</u>.

Applicant's Attorney cannot determine what point the Examiner is trying to make with the allegation that "In another words, the voltage difference between the gate and the well is zero, but they could be held at a non-zero voltage and still have the same value (voltage), which is a constant value, let's say C, where C is a non-zero numerical constant". Regardless of what point the Examiner is trying to make with this allegation, the gate-to-body voltage is exactly zero in mode 3A2 where Litwin's varactor is operated with gate electrode 16 and well 12 at the same (variable) potential. In simple language, the numerical difference between parameters A and B is zero if parameters A and B both equal a third parameter C.

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Nothing in Litwin would provide a person skilled in the art with any motivation or incentive for maintaining the potential between gate electrode 16 and well 12 at some constant non-zero value in any of Litwin's possible operational modes. Claims 17 and 71 are thus patentable over Litwin.

Independent Claims 23, 38, 63, and 79 are patentable over Litwin for the reasons presented in the December 2002 Amendment and the June 2003 Response. The Examiner is again referred to those two documents for these reasons.

Claims 18 - 22, 24 - 31, 39 - 62, 64 - 67, 69, 72 - 78, and 80 - 88 all variously depend (directly or indirectly) from independent Claims 17, 23, 38, 63, 71, and 79. Accordingly, dependent Claims 18 - 22, 24 - 31, 39 - 62, 64 - 67, 69, 72 - 78, and 80 - 88 are variously patentable over Litwin for the same reasons as Claims 17, 23, 38, 63, 71, and 79.

As further pointed out in the December 2003 Amendment, the June 2003 Response, and the January 2004 Amendment, Litwin does not disclose the further limitation of any of dependent Claims 18, 20, 29, 39, 40, 43, 53, 61, 67, 69, 72, 73, and 83. Separate grounds are therefore present for allowing Claims 18, 20, 29, 39, 40, 43, 53, 61, 67, 69, 72, 73, and 83 over Litwin.

Claims 32 - 37, 68, and 70 are patentable over Litwin and Misu for the reasons presented in the June 2003 Response to which the Examiner is referred.

As also pointed out in the June 2003 Response and the January 2004 Amendment, Litwin does not disclose the further limitation of dependent Claim 36 or 70. Consequently, these two dependent claims are separately allowable over Litwin and Misu.

On page 28 of the January 2004 Amendment, Applicant's Attorney presented the following comments about the inversion layer that selectively appears and disappears in a varactor configured according to the invention:

> A core feature of the varactors of the present invention is that an inversion layer which meets the plate region selectively appears and disappears in the body region below the gate electrode as plate-to-body voltage V_R is varied. The capacitance of each of the present varactors undergoes an abrupt change in value as the inversion layer appears and disappears. See pages 15 - 29 of the specification. Especially see pages 22 - 24 where it is pointed out that the capacitance of the present varactors switches between high value C_{VAH} given by Eq. 17 and low value C_{VAL} given

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by Eq. 18 as plate-to-body voltage V_R passes through transition value V_X at which the inversion layer fully disappears.

The abrupt change in varactor capacitance as the inversion layer appears and disappears is acceptable in some applications of the present invention. However, the abrupt varactor capacitance change is highly undesirable in other applications. Accordingly, a substantial portion of the present application deals with techniques for controlling plate-to-body voltage V_R and gate-to-body voltage V_{GB} in such a way as to make the varactor capacitance change more gradually as the inversion layer appears and disappears. See pages 29 - 41 and 55 - 57 of the specification.

Nowhere does Litwin mention operating any of its varactors so that an inversion layer appears and disappears in the well below the gate electrode as potentials applied to the varactor are varied. If Litwin did intend to operate any of its varactors in a mode where an inversion layer selectively appears and disappears, the varactor capacitance would undergo an abrupt change in value as the inversion layer appears and disappears. Such an abrupt capacitance change would have been so important to the operation of Litwin's varactor that Litwin would necessarily have mentioned the abrupt capacitance change and the reasons for the capacitance change, i.e., the appearance and disappearance of the inversion layer, in Litwin's application.

The fact that Litwin does not mention either an abrupt varactor capacitance change or an inversion layer shows clearly and absolutely to a person skilled in the art that Litwin does not contemplate operating any of its varactors so that an inversion layer appears and disappears in the well below the gate electrode. Use of an inversion layer is not inherent to any of Litwin's varactors in any of Litwin's operational modes.

With apparent reference to the preceding comments, the Examiner alleges on page 4 of the present Office Action that "Regarding applicant's argument that the capacitance of the claimed invention undergoes an abrupt change in value as the inversion layer appears and disappears, note that the device of Litwin inherently has this feature by applying the appropriate constant voltages to the appropriate electrodes, while varying the voltage to the remaining electrodes in the structure". This is incorrect.

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A document serves as prior art for use in examining a U.S. patent claim only for the material which the document discloses explicitly and/or inherently. While an electronic circuit formed with a group of transistors and other electronic elements can often be operated in many different ways depending on the voltages applied to the circuit elements, a document dealing with such an electronic circuit serves as prior art only for the operational mode(s) disclosed explicitly in the document and/or arising inherently due to the document's explicit disclosure. An operational mode which is not explicitly described in such a document and

which does not inherently arise from the material expressly disclosed in the document is not prior art.

As mentioned on page 28 of the January 2004 Amendment, nowhere does Litwin mention an inversion layer or the abrupt varactor capacitance change that would result from the appearance/disappearance of such an inversion layer. Such an abrupt capacitance change would, as also mentioned on page 28 of the January 2004 Amendment, have been so important to the operation of Litwin's varactor that Litwin would necessarily have discussed the capacitance change and the inversion layer. The absence of such a discussion in Litwin shows clearly that Litwin does not intend to operate any of its varactors in a mode where an inversion layer appears and disappears in the well, e.g., well 12, below the gate electrode, e.g., gate electrode 16, so as to produce an abrupt capacitance change.

The Examiner's allegation that Litwin's varactor inherently has the abrupt capacitance change feature produced "by applying the appropriate constant voltages to the appropriate electrodes, while varying the voltage to the remaining electrodes in the structure" is speculation not supported by any disclosure in Litwin. Such speculation is not prior art. It is absolutely not inherent to Litwin that an inversion layer appears and disappears in the well below the gate electrode in any of Litwin's varactors during operation in any of the modes contemplated by Litwin.

Nothing in Litwin would provide a person skilled in the art with any reason for modifying any of Litwin's varactors to operate in a mode where an inversion layer selectively appears and disappears in the well below the gate electrode. The inversion layer limitation in each of Claims 23, 38, and 79 makes them patentable over Litwin. The inversion layer limitation in Claim 71 establishes separate grounds for allowing it over Litwin.

Independent Claim 32 requires that the plate region comprise a main plate portion and a plurality of finger portions that extend laterally away from the main plate portion such that at least two of the finger portions extend longitudinally non-parallel to one another. Inasmuch as Claims 33 - 37 and 70 depend from Claim 38, they likewise require that at least two of the finger portions be longitudinally non-parallel. The same applies to dependent Claim 68.

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As pointed out in the June 2003 Response and repeated in the January 2004 Amendment, Misu's Purpose section does not appear to disclose longitudinally non-parallel

fingers. As further pointed out on page 27 of the June 2003 Response and repeated on page 30 of the January 2004 Amendment:

> Figs. 1, 13, 15, 17, 19, 23 - 25, 36, 43, and 45 - 48 of Misu all appear to disclose structures having electrode fingers of varying widths. The longitudinal axes of these electrode fingers are, however, all <u>substantially parallel</u> to one another [Footnote: A longitudinal axis of an elongated object is a straight line that goes in the direction of the object's length.]. None of Figs. 1, 13, 15, 17, 19, 23 - 25, 36, 43, and 45 - 48 appears to disclose longitudinally non-parallel fingers.
>
> Applicant's Attorney is unable to determine what is shown in Misu's Figs. 7 and 9 cited by the Examiner. Figs. 7 and 9 do show dark regions that may be the ends of electrode fingers where they are interdigitated. To the extent that Applicant's Attorney has correctly interpreted Figs. 7 and 9, the longitudinal axes of these finger-shaped regions all extend <u>substantially parallel</u> to one another. As far as Applicant's Attorney can determine, Misu does <u>not</u> disclose longitudinally non-parallel fingers in Figs. 7 and 9, in the Purpose Section, or anywhere else.

On page 4 of the present Office Action, the Examiner now alleges that "Regarding applicant's argument that in the Misu reference, the electrode fingers are parallel to each other, what was referred to in the last Official Action, is figures 7 and 8 themselves that show the dark fingers are not along an straight line, and therefore, are not parallel to each other". This allegation is <u>incorrect</u>.

Two elongated objects extend parallel to each other when their longitudinal axes extend parallel to each other. Misu does not explicitly show the longitudinal axes for electrode fingers 2 in Fig. 7 or 8. However, it is clear from a visual inspection of Figs. 7 an 8 that each electrode finger 2 in Figs. 7 and 8 is symmetrical about its longitudinal axis. Also, the longitudinal axes of electrode fingers 2 in each of Figs. 7 and 8 extend in the same direction. Consequently, electrode fingers 2 in each of Figs. 7 and 8 extend parallel to one another. Misu <u>fails</u> to disclose the longitudinally non-parallel electrode-finger limitation of Claims 32 and 68.

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Applicant's Attorney further pointed out on page 27 of the June 2003 response and page 31 of the January 2004 Amendment that there would be <u>no</u> reason for applying Misu to Litwin even if Misu did disclose longitudinally non-parallel electrode fingers. Applicant's Attorney specifically stated that:

> Secondly, the fingers in Claims 32 and 68 are parts of the plate region and thus consist of semiconductor material. In contrast, the fingers disclosed

in Misu are electrode fingers and thus presumably consist largely of metal. Hence, the fingers in Claims 32 and 68 are constituted quite differently than Misu's fingers.

Thirdly, nothing in Litwin indicates that any gain would be made by modifying Litwin's parallel semiconductor fingers 83, 84, and 91 to be longitudinally non-parallel. Even if Misu does, in fact, disclose longitudinally non-parallel fingers somewhere, there would be no reason for applying the teachings of Misu to Litwin. In this regard, Litwin's fingers are differently constituted than Misu's fingers. As occurs with the semiconductor fingers of Claims 32 and 68, Litwin's fingers consist of semiconductor material whereas Misu's fingers appear to consist largely of metal.

Note that providing the plate region in the varactor of the present invention with longitudinally non-parallel fingers improves the quality factor. See paragraph 262, page 71, of the present application. Nothing in Litwin suggests that using longitudinally non-parallel fingers would improve the quality factor. To the extent the Misu does disclose longitudinally non-parallel fingers, Misu is irrelevant to the patentability of Claims 32 and 68.

As stated on page 31 of the January 2004 Amendment, nothing in the Examiner's response to the arguments presented in the June 2003 response shows that Claim 32 or 68 is unpatentable based on Litwin taken with Misu. Claims 32 and 68 are thus patentable over Litwin and Misu for the reasons given in the June 2003 Response. In fact, since Misu is immaterial to Claims 32 and 68, these two claims are patentable over Litwin and Misu for the same reasons, as presented in the December 2002 Amendment, that Claims 32 and 68 are patentable over Litwin. The same applies to dependent Claims 33 - 37 and 70.

New Claims 89 - 91 all depend (directly or indirectly) from Claim 71. New Claims 92 - 94 all depend (directly or indirectly) from Claim 79. Accordingly, dependent Claims 89 - 94 are patentable over Litwin for the same reasons as Claims 71 and 79.

Additionally, Claims 89 and 92 each recite that "the plate and body regions extend to a primary surface of the semiconductor body" and that "the providing act includes providing a field insulating region extending into the semiconductor body along the primary surface to define a semiconductor island laterally surrounded by the field insulating region and substantially fully occupied by material of the plate and body regions".

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Litwin does not disclose that well 12 and source 13, separately or in combination with drain 14, substantially fully occupy a semiconductor island defined by a field insulating region that extends into the semiconductor body along its upper surface. Consequently,

Claims 89 and 92 are separately patentable over Litwin. The same applies to Claims 90, 91, 93 and 94 because they variously depend from Claims 89 and 92.

New independent Claims 95 and 109 are repeated below:

95. A method comprising:

selecting a varactor which comprises (a) a plate region and a body region of a semiconductor body, (b) a dielectric layer situated over the semiconductor body and contacting the body region, (c) a gate electrode situated over the dielectric layer at least where the dielectric layer contacts material of the body region, and (d) a plate electrode and a body electrode respectively connected to the plate and body regions, the body region being of a first conductivity type, the plate region being of a second conductivity type opposite to the first conductivity type, the plate and body regions meeting each other to form a p-n junction and extending to a primary surface of the semiconductor body, the plate region occupying a lateral plate area along the primary surface, a field insulating region extending into the semiconductor body along the primary surface to define a semiconductor island laterally surrounded by the field insulating region and substantially fully occupied by material of the plate and body regions, the semiconductor island occupying a lateral island area along the primary surface, the varactor having a maximum capacitance dependent on the island area; and

adjusting the plate and island areas to control the minimum and maximum capacitances of the varactor.

109. A structure comprising:

a varactor comprising (a) a plate region and a body region of a semiconductor body, (b) a plate electrode and a body electrode respectively connected to the plate and body regions, (c) a dielectric layer situated over the semiconductor body and contacting the body region, and (d) a gate electrode situated over the dielectric layer at least where the dielectric layer contacts material of the body region, the body region being of a first conductivity type, the plate region being of a second conductivity type opposite to the first conductivity type, the plate and body regions meeting each other to form a p-n junction and extending to a primary surface of the semiconductor body, a field insulating region extending into the semiconductor body along the primary surface to define a semiconductor island laterally surrounded by the field insulating region and substantially fully occupied by material of the plate and body regions; and

electronic circuitry having a capacitance signal path for receiving the varactor to enable the circuitry to perform an electronic function dependent on the varactor, the plate and body electrodes being situated in the capacitance signal path.

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Similar to Claims 89 and 92, Claims 95 and 109 each require that the plate and body regions extend "to a primary surface of the semiconductor body" and that a field insulating region extend "into the semiconductor body along the primary surface to define a semiconductor island laterally surrounded by the field insulating region and substantially fully occupied by material of the plate and body regions". Since Litwin does not disclose or suggest this field-insulating-region limitation, Claims 95 and 109 are patentable over Litwin.

Claims 96 - 108 variously depend (directly or indirectly) from Claim 95. Claims 110 - 122 variously depend (directly or indirectly) from Claim 109. Hence, dependent Claims 96 - 108 and 110 - 122 are patentable over Litwin for the same reasons as Claims 95 and 109.

Litwin does not disclose the further limitation of any of new dependent Claims 91, 94, 96, 98, 100, 101, 110, 111, 113, 115, and 116. Separate grounds are thereby present for allowing Claims 91, 94, 96, 98, 100, 101, 110, 111, 113, 115, and 116 over Litwin.

In summary, all of pending Claims 17 - 122 have been shown to be patentable over the applied art. Accordingly, Claims 17 - 122 should be allowed so that the application may proceed to issue.

Please telephone Attorney for Applicant(s) at 650-964-9767 if there are any questions.

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Respectfully submitted,

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